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Election of ASA Officers

The Committee on Elections reports the following officers were elected as a result of the vote of the membership in November:

President-Elect

WILLIAM R. LEONARD, Statistical Office of the United Nations

Vice-President (1956–58)

MARTIN R. GAINSBRUGH, National Industrial Conference Board

Directors (1956–58)

W. J. YOUDEN, National Bureau of Standards
LESTER FRANKEL, Alfred Politz Research, Inc.

Council—Representative-at-Large (1956–57)

VIRGINIA HOLRAN, Institute of Life Insurance

Council—District Representatives (1956–57)

Northeastern—Sybil Bindloss, Liberty Mutual Insurance Co.

Eastern—Irwin Friend, University of Pennsylvania

Southeastern—Boyd Harshbarger, Virginia Polytechnic Institute

South Central—William H. Kester, Federal Reserve Bank of St. Louis

North Central—Lucile Derrick, University of Illinois

Western—John C. McKee, Douglas Aircraft Co.

NEWS Morris Hamburg New Editor—Sections Elect Officers—Resolutions from Annual Meeting

Change in Editorship of the American Statistician

Almarin Phillips of the Economics Department, Wharton School, University of Pennsylvania, has resigned as editor of *The American Statistician*. Morris Hamburg of the Statistics Department of the Wharton School will assume editorship commencing with the April issue.

Election of Section Officers

The following officers for 1956 were elected by the BUSINESS AND ECONOMIC STATISTICS SECTION as a result of the recent mail balloting:

Chairman-Elect	Geoffrey H. Moore National Bureau of Economic Research
Vice-Chairman for Program	Louis Paradiso Commerce Department
Vice-Chairman for Publications	George Cline Smith F. W. Dodge, Corp.
Vice-Chairman for Regional Activities	George P. Hitchings Ford Motor Company
Secretary-Treasurer	Robert E. Johnson Western Electric Company
Program Chairman	Roy L. Reierson Bankers Trust Company

The SECTION ON PHYSICAL AND ENGINEERING SCIENCES elected two new officers in November. The Chairman and the Executive Committee elected in 1955 serve two-year terms. The new officers are:

Chairman-Elect	W. J. Youden National Bureau of Standards
Secretary	Jack Moshman Bell Telephone Laboratories

The SOCIAL STATISTICS SECTION elected the following by mail ballot last November:

Chairman-Elect	A. J. Jaffe, Columbia University
Vice-Chairman (1956–57)	Forrest H. Kirkpatrick Wheeling Steel Corporation
Secretary (1956)	Walt R. Simmons U. S. Bureau of Labor Statistics

ASA Annual Meeting in New York

Preliminary figures show that about 1400 persons registered for the 115th Annual Meeting of the American Statistical Association, held at the Biltmore Hotel in New York City on December 27–30. This was a record attendance for an ASA annual meeting. If registrations for all 13 allied associations meeting in New York during this period are included the total registration was about 4100.

The sessions were well attended despite some difficulties with hotel arrangements. There were more than 400 at the joint ASA–AEA luncheon session on the economic outlook, and over 300 at the luncheon session on the stock market outlook sponsored by the ASA and the New York Society of Security Analysts. The ASA evening sessions on smoking and cancer and statistical problems in the evaluation of polio vaccine drew a large attendance and were marked by lively discussions. Other highlights of the meeting included the presidential address by Ralph J. Watkins and the informal party which followed it.

The next annual meeting will be held September 7–10 of this year at the Hotel Sheraton-Cadillac in Detroit.

Weiss Resolution and Memorial

The following resolution on Samuel Weiss, which had been adopted by the ASA Board and Council at the October 28th meeting, was read at the Presidential Address Session of the Annual Meeting by Dr. Stuart A. Rice.

Whereas, Samuel Weiss, Fellow of the American Statistical Association, died on July 23, 1955, at the age of forty-five at the height of his career; and

Whereas, during his professional life he made many notable contributions to the improvement of statistical practice, particularly in the service of the Federal Government and was made a Fellow of this Association with special recognition "for his impact on statistical techniques"; and

Whereas, as Chief of the Division of Employment Statistics in the Bureau of Labor Statistics, he exhibited outstanding talent, leadership and coordinating ability in developing the Federal-State cooperative employment statistics program, and later as Chief Statistician of the Bureau of Labor Statistics, brought these same qualities to bear on a wider variety of problems; and

Whereas, he contributed freely of his knowledge, energy, and enthusiasm in promoting the interests of the American Statistical Association, of which he was Secretary-Treasurer and Executive Director for the six years preceding his death, and which he greatly strengthened by putting on a sound financial footing, by gaining new members, by broadening its interests, and by developing widespread support for and interest in the Association's activities among statisticians generally; and

Whereas, he carried these same high levels of professional competence to the various tasks which he undertook, as adviser to the Puerto Rican Government, as representative of the American Statistical Association to the International Statistical Institute on two occasions, as a Fellow of the American Association for the Advancement of Science, as Secretary of the Allied Social Sciences Association; and

Whereas, as a teacher, he was beloved of students, imparting enthusiasm for his high standards, sharing his broad fund of knowledge, drawing on his rich experience of statistical problems and techniques, and inspiring and stimulating

with his broad vision and productive imagination; now, therefore, be it

Resolved, That the American Statistical Association herewith records the profound appreciation of its members and of statisticians generally for the outstanding capabilities of Samuel Weiss as a statistician, administrator and teacher; and expresses a keen sense of loss at the passing of one who never spared himself in the interests of advancing statistical knowledge, techniques or organization, and who brought to his tasks a penetrating intellect, unflagging enthusiasm and a warm understanding.

A committee is to be appointed to devise a suitable memorial for Samuel Weiss.

1956 Program Committee

Plans for the program of the 1956 Annual Meeting in Detroit are already well under way. The Program Committee is headed by Conrad Taeuber, Bureau of the Census, and includes Paul Irick, Purdue University; A. J. Jaffe, Columbia University; Allyn W. Kimball, Oak Ridge National Laboratory; Roy L. Reierson, Bankers Trust Company; Milton Terry, Bell Telephone Laboratory; and Leo Joseph Tick, New York University. Ex-officio members are Martin R. Gainsbrugh, National Industrial Conference Board; Henry Scheffe, University of California; John W. Tukey, Princeton University; and Ralph J. Watkins, Dun and Bradstreet.

The Committee welcomes any suggestions for the 1956 program.

Resolution of Thanks

The following resolution, which was read by Dr. Conrad Taeuber, was adopted at the Presidential Address Session, December 29, 1955.

Be it resolved that the American Statistical Association at its annual meeting in New York in December 1955, expresses its appreciation to:

The Program Committee, which under the Chairmanship of Dr. Martin R. Gainsbrugh, planned a program that clearly reflects the vitality of the Statistical profession and that gave such effective and balanced expression to the wide variety of interests and activities of the members of the American Statistical Association.

The Local Arrangements Committee, including Dr. Francis E. McIntyre, Chairman, and Will Lissner, Sidney Sameth, K. R. Walker, John Firestone, Leonard Burgess, Dr. Oscar Serbein and Mrs. Virginia Holran. The Committee carried out its numerous tasks in a manner which ensured that the members of the Association could carry out the purposes for which they came to these meetings. The Committee also enlisted the cooperation of the New York City Convention Bureau which took care of many of the details involved. Much of the success of these meetings has been due to the efforts of this Bureau, which operated efficiently at all levels.

Robert E. Johnson, President of the New York Chapter of the American Statistical Association, for his energetic and able service as Acting Chairman of the Committee during the critical final weeks when unforeseen business commitments required Dr. McIntyre's presence in Europe.

FEDERAL STATISTICAL ACTIVITIES

Trends in Output Per Man-Hour and Man-Hours Per Unit of Output

The Bureau of Labor Statistics has published a report showing trends in output per man-hour (or its inverse, man-hours per unit of output) covering total manufacturing, nondurable goods industries, and durable goods industries, for the period 1939 to 1947 and the years 1947 to 1953. This is the first time since 1942, when trends up to 1939 were released, that estimates of manufacturing have been published. The estimates are based on a comprehensive study of detailed statistical information from many sources, including the Bureau of the Census, Bureau of Mines, and trade associations, as well as the Bureau of Labor Statistics itself.

Four series of indexes of change in output per man-hour (or man-hours per unit of output) have been prepared, each with its own special meaning. The four indexes are: (1) Physical output per man-hour: base year weighted; (2) Physical output per man-hour: current year weighted; (3) Net output per man-hour: base year prices; and (4) Net output per man-hour: current year prices.

In preparing these indexes, the BLS developed separate estimates of output and of man-hours for the 4-digit industries (Standard Industrial Classification Manual, Volume 1, Bureau of the Budget, November 1945), and then aggregated them to total manufacturing (differently, however, for the physical and net-output series). The report describes the estimating procedures actually followed, summarizes the statistical limitations of the estimates, and outlines a number of observations, tests and comparisons that have been applied to the series to measure their accuracy.

Copies of the report on "Trends in Output Per Man-Hour and Man-Hours Per Unit of Output" may be obtained from the Division of Productivity and Technological Developments, Bureau of Labor Statistics, Washington 25, D. C.

LEON GREENBERG, *Chief,*
Division of Productivity and Technological Developments,
Bureau of Labor Statistics,
Department of Labor

National Survey of Farm Operators' Expenditures

The Agricultural Marketing Service, in cooperation with the Bureau of the Census, is making a national survey of farm operators' expenditures for family living and farm production purposes in the calendar year 1955. The survey is designed to provide (1) new weights for the Parity Index and (2) data necessary for improving United States and State estimates of production expenditures and net farm income.

Detailed information will be collected on the quantities of goods and services purchased for family living and farm production, and the expenditures of farm families for these purchases. The quantity data and information on the relative proportions of expenditures by major categories will be used to revise the weights for the Parity Index. The expenditure data for items used in farm production will also be used to improve present estimates of net farm income.

The survey will be conducted by personal interview, and collection of data will begin early in February. Separate questionnaires will be used for independent samples of about 4,000 farms for family living expenses and about 6,000 farms for production expenses. The data on farm family living expenses will be used primarily in revising the weights for the Parity Index, which is compiled on a United States basis. The data on farm production expenses will be used not only for revising the index weights but also for improving estimates of net farm income by regions and, in conjunction with other available data, by States. The sample for the survey of production expenses is therefore larger than that for living expenses. For tenant-operated farms included in the sample for production expenses, a subsample of about 500 landlords will be interviewed to obtain data on certain expenses paid by the landlord which the tenants cannot supply.

A two-stage probability sample of farms has been drawn for the survey from the 1954 Census of Agriculture, in cooperation with the Bureau of the Census. For the first-stage sample, primary sampling units (usually counties) were stratified into 306 strata within eight geographic regions on the basis of type of farming. One primary sampling unit was then selected from each stratum, with probabilities proportional to size. The second stage employs differential sampling rates by economic class of farm. For production expenditures, because of the relationship between production expenditures and value of products sold, the sample was allocated to economic classes approximately in proportion to value of products sold; whereas for living expenditures, the sample was allocated to economic classes more nearly in proportion to number of farms than to value of sales. Certain data have been transcribed from the Census of Agriculture questionnaires in order to expand the sample and check on nonresponse.

J. RICHARD GRANT, *Statistical Clearance Officer,*
Department of Agriculture

Joint Economic Committee Reports and Publications

All five subcommittees of the Joint Committee on the Economic Report have conducted hearings during recent months, and have now published both hearings and reports. These reports have been approved by the full committee for submission to the Congress, and have now been issued as Senate Reports, 84th Congress, 2nd Session. The hearings and reports of particular interest to statisticians are described in the following paragraphs.

Reports of Federal Reserve Consultant Committees on Economic Statistics (722 pages) presents in one volume the complete reports of the five consultant committees established last year, at the request of the Subcommittee on Economic Statistics, to appraise present statistics on (1) plant and equipment expenditure expectations, (2) savings, (3) consumer surveys, (4) inventories, and (5) general business expectations. The volume also includes the panel discussions of each of these topics during the hearings held by the subcommittee in July and October, when the five reports were transmitted. Copies of the volume may be purchased ($2.25) from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Employment and Unemployment Statistics (167 pages) contains the testimony presented in two days of hearings by the Subcommittee on Economic Statistics (November 7 and 8) on the development and adequacy of current programs in the field of employment and unemployment statistics. It includes statements by Raymond T. Bowman, Assistant Director for Statistical Standards, Bureau of the Budget;

Robert W. Burgess, Director, Bureau of the Census; Ewan Clague, Commissioner of Labor Statistics; Robert C. Goodwin, Director, Bureau of Employment Security; and Omer W. Herrmann, Deputy Administrator, Agricultural Marketing Service. The volume includes a statement prepared for the hearings on "Differences in Concepts and Measurement Procedures and How They Affect Current Series of Employment and Unemployment Statistics." It also includes the Interim Report of the Review of Concepts Subcommittee established last year by the Interagency Committee on Labor Supply, Employment and Unemployment Statistics, presenting conclusions and proposed recommendations on the Census Bureau's Current Population Survey, the BLS current employment statistics series, the BES series based on unemployment insurance claims, and the AMS farm employment series. An appendix presents a statement on "Full-Time Equivalent Unemployment." Copies of this volume may be purchased (45 cents) from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The *1955 Report of the Subcommittee on Economic Statistics* (Senate Report 1309, 21 pages) reviews the work of the subcommittee during the year and emphasizes its interest in further development and strengthening of basic economic statistical programs. Particular attention is given to the reports of the five Federal Reserve Consultant Committees, and the subcommittee presents its recommendations, based on these studies, for immediate needs, longer run needs, and private statistical programs. Copies of the report are available without charge from the Joint Economic Committee.

Automation and Technological Change (644 pages) presents the hearings held October 14–28 by the Subcommittee on Economic Stabilization. The hearings were arranged to study the impact of automation on long-run employment and investment levels, and more than 25 representatives of business, labor and government concerned with the importance of increasing industrial productivity testified. In addition to sessions on the meaning and impact of automation and the place of innovation and technology in the free enterprise system, there were a series of case studies of the effects of automation on specific industries or processes: metalworking, data processing and the office, chemicals, electronics, transportation, and communication. Copies of these hearings are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at $2 a copy.

The *Report of the Subcommittee on Economic Stabilization* on Automation and Technological Change (Senate Report 1308, 13 pages) presents the subcommittee's findings and recommendations as a result of the hearings. Of particular and direct interest to statisticians is the statement that the Subcommittee on Economic Stabilization joins with the Subcommittee on Economic Statistics in a primary interest in "the improvement of economic statistics, especially those relating to productivity and occupational shifts, and an increased alertness on the part of the executive agencies to the responsibility of providing statistics for policymaking in business as well as in Government." Copies of the report are available without charge from the Joint Committee on the Economic Report.

The Subcommittee on Low-Income Families has also published the hearings it held in November (757 pages, $2, available from Government Printing Office) and its own report (Senate Report 1311, 13 pages, available from Joint Committee on the Economic Report). In advance of the hearings, the Subcommittee published "Characteristics of the Low-Income Population and Related Federal Programs," presenting some of the more recent statistics relating to the low-income population. This study (240 pages) is available at 60 cents a copy from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Hearings of the Subcommittee on Foreign Economic Policy, held November 9–17, are also available (620 pages, $1.75 a copy, from Government Printing Office), as well as the report of the Subcommittee (Senate Report 1312, 31 pages, from Joint Committee on the Economic Report). Included among the subcommittee recommendations is one stating that: "We should give added encouragement to the preparation of international statistics, with attention both to the breadth of coverage and the quality of the information; data on national income and its distribution are particularly needed."

In preparation for its hearings on December 5–16, the Subcommittee on Tax Policy published a 930-page compendium on "Federal Tax Policy for Economic Stability and Growth." This volume presents papers submitted by about 80 panelists invited to appear in the hearings, representing the many different viewpoints existing on various aspects of tax policy, and is available at $2.50 a copy from the Government Printing Office, Washington 25, D. C. The hearings (715 pages) are now also available from the Government Printing Office, at $2 a copy. The subcommittee's report on Federal tax policy (Senate Report 1310, 15 pages, available from Joint Committee on the Economic Report) commends to the committees of the Congress "the desirability of obtaining additional data and other information bearing on the economic effects of existing tax provisions and other factors influencing balanced economic growth and stability."

JOHN W. LEHMAN, *Clerk,*
Joint Committee on the Economic Report,
U. S. Congress

Flow-of-Funds System of National Accounts

The Board of Governors of the Federal Reserve System published in December a 390-page volume, *The Flow of Funds in the United States, 1939–53*, as a detailed statistical and methodological presentation of the Board's flow-of-funds system of national accounts at its present stage of development. The introductory chapter of the report, which is a general description of the system, also appeared as an article in the October 1955 issue of the *Federal Reserve Bulletin*.

The detailed data published in the full report are annual series covering the years 1939–53. The *Bulletin* article includes a summary table for 1954. Notice of availability of subsequent material will appear in the *Federal Reserve Bulletin*. Developmental work is now underway to put the accounts on a quarterly basis, but it is not expected that quarterly accounts will be published in the near future.

The purpose of the new system is to provide a comprehensive statistical framework to aid in analyzing the flow of funds through the American economy and in relating financial developments in the economy to the flows of income and expenditures. In carrying out this purpose, the system records all transactions that involve at least two separate economic units and that are effected through the use of credit or money. The transactions covered include transactions in financial instruments, existing assets, transfers of various kinds, and intermediate transactions as well as transactions involving currently produced goods and services.

The system divides the economy into 10 sectors or groups of economic units—consumers, corporate business, nonfarm noncorporate business, farm business, Federal Government, State and local governments, banking system, other institutional investors, and the rest of the world—with further

Continued on page 12

MULTIPLE REGRESSION AND CORRELATION ANALYSIS ON THE IBM TYPE 701 AND TYPE 704 ELECTRONIC DATA PROCESSING MACHINES[1]

F. S. BECKMAN AND D. A. QUARLES, JR.
International Business Machines Corporation

Multiple linear regression and correlation analysis is one of the most fruitful statistical applications of digital computers. A basic objective in this analysis is the expression of a dependent variable, for purposes of prediction or fitting, as a suitable linear function of various independent variables. Geometrically interpreted, for a given data sample of n variables, the computational procedure is designed to determine that hyperplane in n-space which approximates the sample observations of the dependent variable in a least-squares sense. The approximation is regarded as suitable if, apart from what may reasonably be attributed to chance, the values predicted for the dependent variable by the hyperplane account for a large portion of this variable's sample variance. To decide whether the objective of a suitable linear approximation has been obtained, not only are certain statistics computed, but also significance tests are made. The wide range of usefulness of this technique is due to the fact that often, at least for appreciable ranges of the variables involved, the variable chosen as dependent can be approximately expressed as a linear function of various related independent variables, or of functions of such variables. The advent of large digital computers has made possible the convenient handling of the considerable computation required in performing such an analysis upon a substantial number of variables and observations. In this paper we shall describe a procedure that is used to accomplish this analysis on the Type 701 Electronic Data Processing Machine, and shall indicate some of the characteristics of a program, now being prepared, which is to perform a like function on the Type 704 calculator.

The 701 program enables the computation and printing of the following statistics in the order stated: the means and standard deviations; the coefficients of simple and partial correlation, regression, and multiple correlation; and the standard error of estimate. As input data, the program accepts up to 1022 arbitrary five-decimal-digit observations of each of the variables where the array of observations for all variables has no missing entries. At this point, it is perhaps worth mentioning that we encountered no problem in this field of analysis where the five-digit limitation appeared too restrictive. The input data were directly used only in the computation of the sums, sums of squares and sums of cross-products for the variables, and from these three types of sums, the program developed the means, standard deviations, and simple correlation matrix. Two principal formats for the decimal input data cards were deserving of consideration. The data could be arranged by observation (so that the corresponding observations of all variables are grouped together), or by variable (so that all of the observations of a variable comprise one group). It seems that by far the more advantageous of these formats for our purposes was that which we have adopted as a standard, not only for the Type 701, but also for the Type 704 and Type 650 calculators. This standard format requires that the data be arranged by variable, i.e., the first fourteen observations of a variable on the first card, the second fourteen on the second card, etc., and has an important advantage in enabling large simple correlation matrices to be developed conveniently and efficiently, element by element, and row by row. Arrangement of the input data by observation would, for minimal machine time, require a large amount of high-speed storage to accommodate the double-precision partial sums accumulated in the formation of the matrix of cross-products. This would impose a restriction on the number of variables that could be handled efficiently. In our procedure, this restriction is avoided by computing the sums of cross-products serially rather than in parallel. From another viewpoint, the calculation of the simple correlation matrix involves essentially a matrix multiplication to obtain the sums of cross-products, and this input format enables direct formation of the pre-multiplier in such a way that the elements of the product matrix are conveniently generated serially rather than in parallel. The input data are initially read into the 701 from the decimal cards,

[1] This article is based on a paper presented by the authors at the September 14-16, 1955 meeting at Philadelphia of the Association for Computing Machinery.

converted from decimal to binary, and stored, two observations per 36-bit word, on magnetic tape. Thereafter, the input data are read, when desired, into the high-speed electrostatic storage from tape.

The program can then provide as output the means, standard deviations, and simple correlation matrix for up to 138 variables, with up to 1022 observations of each. The determination of the least-squares regression hyperplane is equivalent to solution of the associated system of normal equations. This system of normal equations may be written in matrix form, and the solution vector, which has as its components the regression coefficients, is conveniently expressed in terms of the inverse of the matrix which comprises the simple correlations for the dependent and independent variables. After computation of the means, standard deviations, and simple correlation matrix, the further statistics obtained by the program are, even when the number of variables is appreciable, very readily computed from the inverse of this simple correlation matrix. This matrix is positive-definite and symmetric and, in contrast to the covariance matrix, is optimally scaled. It is, therefore, particularly suitable for inversion using the procedure recommended by von Neumann and Goldstine.[2] Of all well-known methods of inversion, this appears to yield, for arithmetic operations performed with a given precision, the most accurate results and least computational time for a fixed-point calculator, and was adopted in our procedure for the 701. Since the simple correlation matrix can be near-singular when some of the variables are highly correlated—and this often occurs where products or powers of some of the other variables are introduced as additional variables, there seemed good justification for choosing an inversion method which was well-equipped to handle such ill-conditioned matrices. The inversion subroutine which was incorporated in the program is limited to handling matrices of 50th order or less, and thus a complete regression analysis is able to be performed by the 701 program for up to 1022 observations of each, of at most, 50 variables.

The partial correlation coefficients obtained are those which relate each variable to each other variable while holding fixed the remaining variables. In accordance with standard terminology, these partial correlation coefficients are said to be of order two less than the number of variables. The 701 program is somewhat restricted in that, from a single execution of the program, a regression analysis is performed with only one dependent variable for one given set of independent variables. After the computation of the partial correlation matrix, the program computes, for the specified dependent variable, the regression coefficients which determine the least-squares hyperplane, the multiple correlation coefficient, and the standard error of estimate. The square of the multiple correlation coefficient may be expressed as that fraction whose denominator is the dependent variable's sample variance and whose numerator is the variance of the corresponding values determined by the regression hyperplane. Consequently, the multiple correlation coefficient may be regarded as a measure of the goodness of fit of the regression hyperplane. The standard error of estimate is the square root of the average squared deviation of the observed values of the dependent variable from the values predicted by the hyperplane. The 701 program also optionally treats one variable, or each variable in turn, as dependent, while regarding each of the remaining variables as independent, obtaining all sets of the above described statistics without performing more than one matrix inversion. To illustrate the speed of this program, the complete 701 processing, including data and program loading, calculation checked by duplication, and printing of all of the described statistics, for a problem consisting of 221 observations on each of 31 variables, required less than 26 minutes.

One convenient test of the significance of such a regression analysis may be made in terms of the partial correlation coefficients. A Student's t table is used, with each entry obtained by multiplying a partial correlation coefficient by the square root of the fraction whose numerator is the number of observations minus the number of variables (this numerator equals the number of degrees of freedom) and whose denominator is unity minus the square of the partial correlation coefficient. From the tabulated probabilities, one can test whether a partial correlation coefficient, and hence the corresponding regression coefficient, are significantly different from zero. These tests, when combined with the comparative importance of the variables as indicated by the sizes of the products of the regression coefficients by the sample standard deviations of the corresponding variables, can often enable a useful reduction of the number of variables to those that are of appreciable importance for further regression studies. There is, however, no assurance that a subset of variables selected in this way is an optimum subset. For example, if some of the independent variables in this subset are highly correlated, it is quite possible that the multiple correlation coefficient for this subset would be significantly less than that for another subset with a smaller number of variables.

A program for the Type 704 calculator is being designed along similar lines, but will have some important differences. It will enable computation of the same statistics as obtained by the 701 program, and will also compute the standard errors of the regression

[2] "Numerical Inverting of Matrices of High Order," *Bulletin of the American Mathematical Society*, November 1947, pp. 1021–1099.

coefficients. As previously stated, it will have the same standard decimal-input-card format. However, instead of using the 704 for decimal data card reading and for printing, it will be possible to use the less expensive card-to-tape and tape-to-printer peripheral equipment. The card-to-tape machine will produce binary-coded-decimal input tapes which will serve as input to the 704. As additional conveniences to the users of this 704 program, we are considering the preparation of subroutines which transpose data arranged by observation to the arrangement by variable described above, delete any set of observations for which not all variables are represented, optionally perform logarithmic transformations on the variables and, if desired, introduce new variables which are second degree terms in the original variables. Furthermore, this 704 program is being arranged so as to be able to compute the means, standard deviations and simple correlation coefficients, with considerably higher bounds on the number of variables and of observations, and provide as output also the intermediately computed sums, sums of squares, and sums of cross-products.

It is again planned to perform a matrix inversion and to calculate the other output quantities in terms of this inverse matrix. However, only a matrix of independent variable simple correlations will be inverted with the inversion verified by mathematical checks rather than duplicate computation. This permits convenient handling of more than one dependent variable for a fixed set of independent variables without the performance of more than one matrix inversion, and convenient calculation of the regression coefficients, multiple correlation coefficients, standard errors of estimate, standard errors of the regression coefficients, and partial correlation coefficients. In support of the view that it is desirable to perform a matrix inversion, Hotelling makes the following statement.[3] "In solving normal equations it should be understood that it is highly desirable first to obtain the inverse matrix. This fact is often overlooked, but the necessity of computing standard errors and the frequent desirability of other uses of the inverse matrix—for example, adding to or taking from the set of predictors—are cogent arguments for adopting a standing rule that no large system of linear equations should ever be solved excepting by first finding the inverse of the matrix of their coefficients." The 704 differs from the 701, among other ways, in that it has built-in floating-point arithmetic operations. Therefore, it appears to us unnecessary to follow the detailed procedure of the von Neumann-Goldstine matrix inversion method, a substantial part of which is designed not only to minimize the number of arithmetic operational parts of the floating-point numbers, and will use but also to avoid floating-point operations. The inversion subroutine that we are planning to use in the 704 program will employ double-precision floating-point arithmetic operations, maintaining the equivalent of approximately 16 decimal digits in the fractional parts of the floating-point numbers. It will be an elimination[1] scheme including positioning for size.

It is believed that the standard errors of the regression coefficients will provide important additional information in interpretation of the results of the regression analysis, by enabling the determination of confidence intervals for the regression coefficients. The 704 program will provide as output such confidence intervals, with several levels of significance, determined for each regression coefficient from Student's t distribution. By referring to these intervals, one can test not only whether each regression coefficient is significantly different from zero, but also with what reliability this sample coefficient can be used to represent the corresponding population regression coefficient. We are investigating procedures which are aimed at reducing the number of independent variables, since a subset of such variables may account for a significant part of the sample variance of the dependent variable. To perform conveniently a matrix inversion with a reduced number of variables before or after completion of a regression analysis, it is planned to include in the 704 program a subroutine for eliminating arbitrary rows and columns of the simple correlation matrix which, as in the 701 program, is stored one tape record per row on magnetic tape. This will avoid the unnecessary recomputation of the remaining rows and columns of the simple correlation matrix. A supplementary subroutine will enable computation of the predicted values and/or the residuals (i.e., differences between the observed and predicted values of the dependent variable).

In conclusion, we should like to say that increased interest in applications of multiple regression and correlation analysis has been very encouraging to the program development which we have undertaken, and which we are now continuing, in this field of work. Comparatively little interest in this direction was shown by the users, or potential users, of our equipment until the general 701 program which we have described was developed[4] and, since that time, a very

Continued on page 16

[3] *Statistical Inference in Dynamic Economic Models*, Cowles Commission Monograph No. 10 (John Wiley & Sons, Inc., 1950), p. 323.

[4] This 701 program was planned and written by several members of the IBM Data Processing Center including Anthony Ralston, H. S. Wilf, P. K. Bennett, and the authors of this paper.

ADMISSIBILITY IN COURT OF UNIVAC SEASONAL COMPUTATIONS

WIRTH F. FERGER

Internal Revenue Service[1]

In the February 1955 issue of *The American Statistician* Julius Shiskin described the Univac program prepared in the Census Bureau for computing moving seasonal factors and removing them from time series of economic data. Since electronic data processing is such a new art, so far as known there is no body of precedent for determining the conditions under which the results will stand up to the strict legal standards of admissibility in evidence. Few statisticians are competent to program and operate a Univac—certainly not the writer. Does this prevent a statistician in his court testimony from employing the results of the time-and-money-saving electronic methods? What are the pitfalls, and what are the defenses of the testifying witness in presenting data processed electronically?

The writer recently had such an experience before the Tax Court of the United States in connection with presenting monthly sales of a metropolitan department store, seasonally adjusted, compared with the Federal Reserve Bank index of all department store sales for the same metropolitan area, seasonally adjusted, over a ten-year period. This is only one instance of court use of Univac computations, and its value as a precedent is thus limited, but the experience should be of interest to statisticians generally. The principles developed should be applicable to the general problem of court use of electronically processed data.

Under the rules of evidence, generally speaking, when a statistician presents his material in court, he must not only establish the authenticity of the original data employed, but he must also testify that any statistical computations thereon were made by him or under his immediate direction and supervision. If he cannot assume complete responsibility for the final data presented because he has delegated some of the statistical work to another person, that person must appear in court before the results are admissible in evidence, in case objection is made by opposing counsel.

In the present instance, the original data represented sales of a given store during four- or five-week periods closely corresponding to calendar months. After reducing the data to daily average sales, corresponding to the method employed by the Federal Reserve Banks in deriving the well-known department store sales indexes, the writer made arrangements with the Census Bureau to compute and eliminate the seasonal movements according to the methods described by Shiskin. The material received from the Census Bureau consisted of nine tables constituting the print-outs from the Univac (the most important of the nineteen tables illustrated in Shiskin's article), and a form transmittal letter to which were attached three exhibits: a list identifying each of the nine tables, a four-page detailed description of the seasonal methodology which had been programmed into the Univac, and the instructions given to the punch card operator for transcribing the original data.

On receiving the print-outs from the Univac, the writer modified the seasonal factors for March and April for the changing date of Easter, where necessary, using the precise adjustment factors employed by the Federal Reserve Bank in connection with its index for the corresponding metropolitan area. These revisions were inserted by hand over the Univac results on the table showing seasonal factors, and the corresponding amendments of the Univac results for the final seasonally adjusted series were made on a calculating machine and inserted by hand on the proper print-out table.

In his testimony describing the derivation of the seasonally adjusted series, the writer stated that the computations were made under his direct supervision, and that he had used one of the standard statistical methods commonly recognized in computing and removing the seasonal factors. It was obvious from the table offered in evidence that the details of the computations of seasonals were not shown, and upon a question from opposing counsel the witness stated that the arithmetical computations had been made on the Univac electronic calculator at the Bureau of the Census. Thereupon the admissibility of the table resulting from the seasonal elimination was challenged unless the computations were supported by the testimony of the person in the Census Bureau who supervised or carried out the computations. The witness replied that he took full responsibility for the

[1] The views expressed are those of the author, and do not necessarily represent the policy of the Internal Revenue Service.

machine computations, but the attorney persisted in his objection.

Opposing counsel stated his understanding that the computation of seasonal factors was a very lengthy and complicated process, requiring the exercise of judgment at many points; even the computation of a 12-month moving average requires judgment. The present witness, he understood, could not even state of his own knowledge that the correct data had been fed into the machine, nor what controls over accuracy had been maintained in the various steps. He had been told that the new electronic calculators were marvelous machines, and he was not questioning the accuracy of the machine itself; but the computation of the seasonal calculations had been delegated by the present witness, and the person who supervised the calculations and used his own judgment in so doing must take the stand for testimony and cross-examination.

The witness (the writer) then set the record straight on the facts. No one at the Bureau of the Census exercised the slightest judgment in any part of the computations, but merely followed the method spelled out in the article by Shiskin. The work on the Univac was a purely mechanical operation. The only judgment exercised was the judgment of the witness himself when he selected the method described in the *American Statistician* article as representing acceptable methodology for computing and removing seasonal factors, and decided to employ this method. When he arranged with the Census Bureau to do this job on the Univac, he knew precisely what the Univac would do and was directly supervising the work just as truly as if he had had two calculating machine operators working in his own office for two weeks, giving them the same detailed instructions, and supervising their carrying out of these instructions. The only difference, aside from time and expense, was that the Univac had built-in controls which would prevent the propagation of any mechanical error. The witness could positively state that the correct data had been fed into the Univac because the first print-out table showed the original data as they came out of the machine, thus showing what had been put into the machine. The six supplementary tables in the print-out enabled the witness to observe the results of the successive computations as they were made and judge whether the general method was truly applicable to the immediate series; the witness had reviewed these tables and stated as his judgment that the methodology was appropriate and gave reliable results in this particular case. The witness had testified that all of the computations were carried out under his direct supervision, and he reaffirmed this statement concerning the Univac operations: he knew in detail what instructions were given to the Univac, it was a purely mechanical operation, and he could personally testify to the accuracy of the results in the same manner, but with greater assurance, as if the work had been done by statistical clerks in his own office.

Opposing counsel had one further question. Was it not true that when the Census Bureau computed these seasonal factors they employed data from department stores in general or from some other sources beside the data for the single store under consideration? The witness assured him that the only data fed into the machine were the 120 monthly figures for the daily average sales of the one department store in question, and that no other data of any kind entered into the calculations.

With this explanation, the objection to the introduction into evidence of the seasonally adjusted series computed by Univac vanished into thin air. Counsel requested, however, that the entire nine tables of print-out from the Univac be offered in evidence, along with the memorandum from the Census Bureau describing in detail the method employed, and this was agreed to.

In summary, it seems that for electronic computations to be admitted into evidence, the witness presenting them must be able to testify: (1) that he is familiar with the statistical theory and techniques involved, (2) that he exercised his own judgment in selecting this methodology as appropriate to the problem in hand, (3) that he has reviewed the results and has found both that the data fed into the machine were accurate and that a critical examination of the supplementary print-outs indicates that the results are satisfactory in the instant problem. He should be prepared to offer in evidence the complete set of print-outs and memoranda giving details of the meaning of these print-outs. After all, Univac is only an electronic clerk serving the statistician, amazingly rapid, but doing precisely what the witness has instructed it to do. The witness must choose the methodology and inspect, appraise, and vouch for the arithmetical results on his own responsibility. Under these conditions electronically processed data should be admissible in evidence in any court.

ELECTION OF NEW FELLOWS

At the Annual Meeting of the Association in New York City the Committee on Fellows, composed of William G. Cochran (Chairman), A. Ross Eckler, Helen Walker, Paul Olmstead and Martin Gainsbrugh, announced that the following new Fellows had been elected:

Charles A. Bicking: Bureau of Ordnance—Early and staunch advocate of Statistical Quality Control in applications to clerical work and chemical engineering; active participant in committees on the use of statistics in engineering societies; author of numerous papers; currently in charge of important statistical work in the Office of Ordnance.

John W. Boatwright: Standard Oil Company of Indiana, for large-scale applications of statistics to business problems, for extensive service on important advisory committees, and for success in convincing leaders in various fields of the need for more and better statistics.

Raymond T. Bowman: Assistant Director for Statistical Standards, Bureau of the Budget; and formerly Chairman, Department of Economics, University of Pennsylvania; distinguished educator for more than a quarter century; pioneer in the conceptual and statistical development of national and social accounting; most recently, as head of the Office of Statistical Standards, a prime mover in the further development and improvement of the existing body of statistical knowledge, nationally and internationally.

George E. P. Box: Imperial Chemical Industries, England, for his original and important contributions to the design of sequential experimental programs for determining optimum conditions in research in the chemical industry.

Miles L. Colean: Washington, D. C., widely recognized authority on the economics of construction; a constructive critic of all aspects of construction statistics and a leader in cooperative efforts of government and private industry to integrate and improve such data; consultant to government agencies in the United States and Canada.

Cuthbert Daniel: Consultant, New York City—Successful consultant in planning chemical experiments, skillful in devising and analyzing complex statistical problems; ardent proponent of the use of statistical method in industrial experimentation.

Georges Darmois: University of Paris, France, for his leadership in the training of mathematical and applied statisticians in his native land, and for his many services to international cooperation among statisticians.

Wilfrid J. Dixon: University of California in Los Angeles, teacher, co-author of an outstanding elementary textbook which reflects the modern point of view in statistical thinking, author of valuable papers on the theory of rank order statistics, serial correlation analysis and sensitivity testing.

Robert J. Eggert: Marketing Research Manager, Ford Division, Ford Motor Company, for his contributions in the application of statistical techniques and processes to practical, business operations in a basic American industry; a leader in the development and incorporation of research into business activities, particularly in the field of programming.

Harold F. Greenway: Dominion Bureau of Statistics, for pioneer work in the collection of family expenditures data in Canada and for the effective administration of varied statistical programs including cost of living, housing, and employment and unemployment.

Louis Guttman: Israel Institute of Applied Social Research, distinguished contributor to the use of mathematical and statistical techniques in the service of sociology and social psychology, author of many substantial and important papers on scale theory and factor analysis, organizer and director of the Israel Institute of Applied Social Research where he performed significant analysis for the development of the new state.

Samuel P. Hayes, Jr.: Director, Foundation for Research in Human Behavior, Ann Arbor, Michigan; distinguished son of a distinguished father, with outstanding contributions in statistics, social psychology, and economics; university teacher, government representative on foreign missions, business executive, and now Foundation Administrator, his writings, particularly in the statistical measurement of political attitudes, have gained for him national prominence.

Tulo H. Montenegro: Secretary General, Inter American Statistical Institute, Washington, D. C., for outstanding technical contributions to the national censuses of Brazil and for leadership in the training of statisticians in Latin America.

Harold Nisselson: Bureau of the Census, for notable contributions to improving the methodology of data collection in censuses and sample surveys through application of quality control concepts to field organization and for furthering the development of survey techniques for collection of morbidity data from households.

Eugene W. Pike: Lincoln Laboratory, Massachusetts Institute of Technology, leader in promoting sta-

tistical method in the field of physics; organizer of the Storrs conference for this purpose; physicist and engineer who is contributing in an important way to statistics.

Grant T. Wernimont: Eastman Kodak Company, chemist who has simplified interlaboratory test programs by introducing features of Statistical Quality Control suitable for analysis of variance situations; active in Gordon conferences on use of statistics in chemistry; author of pertinent papers; chairman of an engineering society task group on planning interlaboratory test programs.

Frank Wilcoxon: American Cyanamid Company, inventor of several nonparametric tests that many statisticians have found useful for speedy evaluation of test data; chemist who has used statistical methods in testing fungicides, insecticides, hormones and herbicides.

Theodore D. Woolsey: Public Health Service, Washington, D. C., for his mastery of the strengths and weaknesses of the different approaches by which information about the health status of population groups can be sought, and for his researches on methods of obtaining reliable information on health and sickness.

FEDERAL STATISTICAL ACTIVITIES —Continued from page 5

subdivisions or subsectors for the three financial institution sectors, and shows accounts for each of these sectors and subsectors.

The account for each sector is a sources and uses of funds statement recording all the transactions that the economic units in the sector engage in. In the sector accounts, the transactions are grouped in terms of 12 nonfinancial transaction categories and 9 financial transaction categories. Nonfinancial transaction data are recorded on a gross basis. For the financial transaction categories, net flows are shown for each category of financial assets and liabilities for each sector.

The various categories of transactions are recapitulated in transaction accounts that show the sectors participating in each category. The transaction accounts for all financial transaction categories except corporate securities record amounts outstanding for the assets and liabilities of each sector as well as the net flows.

In addition to the sector and transaction accounts, the report contains many detailed reconciliations between series in the flow-of-funds accounts and corresponding series in the income and product accounts, SEC statistics, Treasury records, and banking statistics.

The flow-of-funds accounts were developed, in general, on the basis of available statistical series, which were adjusted as required to obtain series with appropriate and consistent definition and coverage for incorporation in the flow-of-funds accounts. No special direct compilations of new data were made. In some cases where directly pertinent data were lacking estimates were made on the basis of moving series, related data, residuals, or arbitrary allocations. The data sources and calculating procedures used are described in detail in the book.

Copies of *The Flow of Funds in the United States, 1939–53* may be purchased at $2.75 each from the Division of Administrative Services, Board of Governors of the Federal Reserve System, Washington 25, D. C.

STANLEY J. SIGEL,
National Income, Moneyflows, and Labor Section,
Division of Research and Statistics,
Board of Governors of the Federal Reserve System

Economic Sector Price Indexes

The Bureau of Labor Statistics has recently released a new economic sector classification of its Wholesale Price Indexes. The new economic sector indexes describe price changes at various levels of production and in various sectors of the economy, and thus will make possible more complete analysis of price behavior. They are released as part of the regular monthly report on the Wholesale Price Index.

In the new series, the nearly 2,000 commodities included in the regular monthly indexes have been regrouped among three categories: (1) raw or crude materials; (2) intermediate materials for further processing, components and supplies; and (3) finished goods. Each of these three categories is further subdivided according to end-use and durability of the commodities. This classification supplements, but does not replace, the regular classification of the Bureau's Wholesale Price Index by product industry groups.

A special report on "Economic Sector Indexes, January 1947–July 1955" has been released by BLS. The report includes a brief description of the new classification system, with tables and charts showing monthly indexes for all categories from 1947 forward, and the basic classification and weighting structure upon which the indexes are based. Comparable indexes for earlier years are not available for all of these categories because the list of commodities priced prior to 1947 was much more limited. The report may be obtained upon request from the Division of Prices and Cost of Living, Bureau of Labor Statistics, Washington 25, D. C.

H. E. RILEY, *Deputy Chief,*
Division of Prices and Cost of Living,
Bureau of Labor Statistics,
Department of Labor

Biostatisticians Wanted

Openings for two biostatisticians in the New York State Department of Health. Starting salaries $4,130 with annual increases to $5,200.

Positions are to be filled by civil service examination held April 16 and open to any qualified citizen of the U. S. Qualifications—bachelor's degree including or supplemented by 15 credit hours in statistics and mathematics, of which six must be in statistics; also, one year of experience in professional statistical work; one year of post-graduate training in an approved school of public health (candidates who expect to complete this by June 30 may take the examination); or a combination of this training and experience.

Apply to Recruitment Unit, N. Y. State Department of Civil Service, Albany, New York, before March 16, 1956.

REPORT OF THE AD HOC COMMITTEE TO EXPLORE OPINION ON STANDARDS

The report of the Ad Hoc Committee on Statistical Standards, which was published in "The American Statistician" July, 1954, recommended—

1. That a thorough and continuing piece of work be done, or none at all
2. That "a large number of reports of specific incidents" should be secured, "dealing with all the wide variety of problems which standards for the Association must cover", and
3. That the work be undertaken only if there is substantial interest of members.

The Committee added, "The range of problems might involve statistical terminology, methods, methodology and procedures, organizational relationships—and also incidents having to do with the reporting and use of statistical results".

The procedure by which standards would be developed would be similar to that used by the American Psychological Association, in which 1,100 members submitted specific cases of ethical and unethical conduct to a committee, which labored for five years to classify them, foster discussion and revision of them and finally to formulate principles on which their Association generally agreed. This process assured that there was widespread consensus on every principle which was finally accepted.

The same method was visualized by our Committee as applicable to the development of standards, with regard to acceptable statistical and reporting procedures as well as to standards of ethical conduct. The cases given in Darrell Huff's "How to Lie with Statistics" are of the type from which good practices might be formulated by an ASA committee.

Before embarking on a venture of such magnitude, President Marshall in September, 1954 appointed William W. K. Freeman Chairman of an Ad Hoc Committee to Explore Opinion on Standards, which in the next 15 months drew from the Chapters of the Association sufficient expressions of the sentiment of its members to make a report to the Board at the Annual Meeting just held.

Of the 34 Chapters organized at the time of the survey, 17 took votes by mail or in meetings, which were generally from 2:1 to 6:1 in favor of standards, and 4 more Chapters were judged as likely to be in favor—a total of 21 Chapters in favor. On the other hand, 7 Chapters were found to be uninterested or opposed, and 6 gave no trustworthy indication of their attitude, which in itself is an indication of lack of interest—a total of 13 not interested, including some of the largest Chapters.

The Committee therefore recommended that the Association defer action until there is more interest in formulating standards. The Board accepted this recommendation, and no further action is planned now at the national level.

Some Chapters, however, have begun to collect critical incidents or specific cases which might be considered good ethics or bad ethics. The Secretary of the Association would like to encourage the continuing of this activity and the collection also of cases of inappropriate or unacceptable statistical practice, since incompetent practice often is indistinguishable from unethical behavior.

Chapters which have Committees on Standards are therefore urged to keep them alive and to submit brief descriptions of critical incidents; and other Chapters and individual members of the Association are likewise invited to send directly to the Secretary incidents to be accumulated for analysis.

The survey of Chapters has brought to light some activities and views which will be of interest to others:

1. The Albany Chapter developed specifications for statistical workers of various qualifications, for recruitment and promotion in the New York State service.
2. The new Buffalo-Niagara Chapter is appointing a committee which proposes to correct errors of statistical inference appearing in the newspapers. Their experience will bear watching.
3. In Puerto Rico, the Territorial Government is developing standards along the lines of the Bureau of the Budget of the United States.
4. A really bright spot of interest is Hawaii, where 62% responded and voted 7:1 for standards. They have assisted in establishing statistical standards in the Territorial Government, have helped set up standards and requirements for statistical processing of tax data, and cooperated in auditing publications.
5. Some academic Chapters consider the standardizing of symbols a pressing need.

The following standards are among those now in use:

a. Bureau of the Budget—"Standards for Publication of Statistical Data" June 16, 1947.
b. Bureau of the Budget—"Standards for Statistical Surveys" March 28, 1952.
c. United Nations Sub-Commission on Statistical Sampling—"Recommendations Concerning the Preparation of Reports on Sampling Surveys" 1948.

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QUESTIONS AND ANSWERS

Edited by ERNEST RUBIN
U. S. Department of Commerce
and American University

Reconstruction of Historical Statistics II

Time Series

In the October 1955 issue of this publication I discussed briefly some of the problems that arise in the process of salvaging statistical data from historical documents. Various readers expressed a strong interest in this topic and requested further discussion of it. The field of historical series provides many interesting problems requiring statistical reconstruction.

Statistical series are often a primary source of information; consequently the accuracy of such data is of considerable importance. Continuing efforts should therefore be made, (a) to provide the most accurate information for statistical series that are in the process of formation; and (b) to correct, adjust, revise and in any other way improve historical series. The advances in statistical theory make possible and feasible a review of historical materials with the end in view of obtaining new statistical information, as well as improved data, from the original sources.

For the present discussion I will consider the problem of revising a statistical series when certain parameter information is inexact or inadequate and when it is possible to sample the original documents and/or use collateral data. The volume *Historical Statistics of the United States, 1789–1945*[1] contains two tables on immigration to the United States for the period 1820–1945[2]. The figures in the total's column, for the period 1820–1868 inclusive, of these two tables differ considerably. The first problem is to reconcile the statistics shown in these tables.

An examination of the source material indicates that the table on age of immigrants (at page 37) includes passengers of United States nativity (or citizenship). Consequently the totals in this table are higher than those in the table on immigrants by country (at pages 33–36). I have prepared Table 1, reconciling this information and indicating the proportion of U. S. citizens among the total arrivals.

It will be noted from this table that the proportion of U.S. citizens to total arrivals fluctuated considerably during this 49 year period. In 1849, e.g., the U.S. citizen group constituted only 0.9 percent while in 1826 it made up 22.1 percent of total arrivals. Since arriving U.S. citizens were included in the table of the age of immigrants, it is apparent that for the years 1820–1868, this table reflects the age distribution of total arriving passengers and not the age distribution of immigrants. (It should also be indicated that the age distribution table for the period 1820–1866 contains another limitation, i.e., the "age not stated" category.) The second problem requires us to obtain separately the age distributions of immigrants and of U.S. citizen passengers for the period 1820–1868.

There are two methods of obtaining the age distribution of immigrants during this period. Given the availability of immigration manifests, it is possible to obtain therefrom a random sample of arriving passengers for each year, 1820–1868, which will yield separate age distributions for immigrants and for U.S. citizens. Such an undertaking would, of course, require considerable time and effort to accomplish. By way of testing the procedure, a sample was obtained for the year 1860. The National Archives in Washington assisted this project, making available 7 manifests for 1860. Miss Lila Hartman, a former student of mine at American University developed a 5 percent sample from 3 of the 7 manifests; she obtained a sample of 337 individuals, consisting of 184 males and 153 females. The results of this sample, with a comparison to related universe data are shown in Table 2. The sample result of this single year is not conclusive but suggests that the age distribution of arriving U.S. citizens was different, i.e., significantly older, than that of the alien passengers; a more detailed examination of the manifest records for the period 1820 to 1870 confirms this idea.

An important result, on the basis of the sampling information, is a more detailed age distribution, by sex, than is available from the published compilations. Bromwell gave detailed information of the age distribution of arriving passengers, for the period 1820–1855, using 5 year class intervals up to age 40.[3] Age distribution data for immigrants, as published in the official reports are given for only the three groups,

[1] United States Bureau of the Census, (U.S.G.P.O., 1949).

[2] Ibid, pp. 33–36 "Immigration—Immigrants by Country: 1820–1945", and p. 37 "Immigration—Age of Immigrants: 1820–1945".

[3] William J. Bromwell. *History of Immigration to the United States*, (Redfield, New York 1856).

Table 1. Arrivals of U. S. Citizens and Alien Passengers, by Sea: 1820–1868

Year	Total passengers	Alien Passengers	U. S. Citizen Passengers	US as % of Total	Year	Total Passengers	Alien Passengers	U. S. Passengers	U. S. as % of Total
1820	10,311	8,385	1,926	18.7	1850[b]	380,904	369,980	10,924	2.9
21	11,644	9,127	2,517	21.6	51	408,828	379,466	29,362	7.2
22	8,549	6,911	1,638	19.1	52	397,343	371,603	25,740	6.5
23	8,265	6,354	1,911	23.1	53	400,982	368,645	32,337	8.1
24	9,627	7,912	1,715	17.8	54	460,474	427,833	32,641	7.1
25	12,858	10,199	2,659	20.7	55	230,476	200,877	29,599	12.8
26	13,908	10,837	3,071	22.1	56	224,496	200,436	24,060	10.7
27	21,777	18,875	2,902	13.3	57	271,982	251,306	20,676	7.6
28	30,184	27,382	2,802	9.3	58	144,906	123,126	21,780	15.0
29	24,513	22,520	1,993	8.1	59	155,509	121,282	34,227	22.0
1830	24,837	23,322	1,515	6.1	1860	179,691	153,640	26,051	14.5
31	23,880	22,633	1,247	5.2	61	112,702	91,918	20,784	18.4
32	61,654[a]	60,482[a]	1,172[a]	—[a]	62	114,463	91,985	22,478	10.9
33	59,925	58,640	1,285	2.1	63	199,811	176,282	23,529	11.8
34	67,948	65,365	2,583	3.8	64	221,535	193,418	28,117	12.7
35	48,716	45,374	3,342	6.9	65	287,399	248,120	39,279	13.7
36	80,972	76,242	4,730	5.8	66[c]	373,229	332,498	40,731	10.9
37	84,959	79,340	5,619	6.6	67[c]	342,162	303,044	39,118	11.5
38	45,159	38,914	6,245	13.8	68[c]	328,148	288,088	40,060	12.2
39	74,666	68,069	6,597	8.8					
1840	92,207	84,066	8,141	8.8					
41	87,805	80,289	7,516	8.6					
42	110,980	104,565	6,415	5.8					
43	56,529	52,496	4,033	7.1					
44	84,764	78,615	6,149	7.3					
45	119,896	114,371	5,525	4.6					
46	158,649	154,416	4,233	2.7					
47	239,482	234,968	4,514	1.9					
48	229,483	226,527	2,956	1.3					
49	299,683	297,024	2,659	0.9					

[a] The data are for the period Oct. 1, 1831 to December 31, 1832, i.e., 15 months, but are incomplete.

[b] The data are for the period Oct. 1, 1849 to Dec. 31, 1850, i.e., 15 months.

[c] These data are from the *Special Report on Immigration* by E. Young (Washington, G. P. O., 1873), p. XXIII.

Sources: William J. Bromwell, *History of Immigration to the U.S.*, (Redfield, N. Y., 1856); *Immigration into the U.S., 1820 to 1903*, U. S. Bureau of Statistics (Commercial Monographs, G. P. O., Washington, 1903) p. 4358; *Historical Statistics of the U.S., 1789–1945*, (USGPO, 1949) pp. 33-37.

i.e., under 14 years, 14 to 40 years, and 40 years and over. These age distributions, while of some value, are inadequate for many purposes. It is desirable that these data correspond to the age and sex classifications adopted in census compilations.

As a substitute for sampling of passenger manifests or as a collateral method, it is important to examine the emigration statistics of foreign countries for the period 1820–1868. Unfortunately the statistics of the age distribution of emigrants were not published in sufficient detail to be useful. A few countries, notably Norway and Sweden give detailed age distribution data. Norway, for the period 1866–1876, gave the age distribution of emigrants to the United States, by sex and by 11 age group intervals.[4] Sweden for the period 1861–1870 gave the age distribution of emigrants (to all destinations) by sex and by 11 age group intervals.[5] Other countries that were important sources of emigration to the United States during the period 1820–1868 give inadequate age distributions as to emigrants.

The two sources of official data that would normally complement each other, such as immigration and emigration, are thus seen to be lacking in the data that are desired. The remaining possibility, if the U.S. statistics are to be adequately revised, is a more extensive resort to sampling of the immigration manifests. It is not necessary to sample the immigration experience of each of the 49 years of this period. Adequately large samples, spaced by 5 year intervals, i.e.,

[4] *International Migrations, Volume I, Statistics*, by I. Ferenczi and W. F. Willcox, (National Bureau of Economic Research, N. Y. 1929), p. 748 and p. 754.

[5] *Historisk Statistik för Sverige* (Historical Statistics of Sweden) I, Befolkning (Population): 1720–1950, (Central Bureau of Statistics, Stockholm, 1955), p. 71.

Table 2. Age Distribution of Arriving U. S. Citizens and Immigrants, 1860

Age	Universe[a] Total passengers	Universe[a] Per cent	Sample Total passengers	Sample Per cent	Sample Alien passengers	Sample Per cent	Sample U.S. citizens passengers	Sample Per cent
0–14 years	28,629	16.1	54	16.0	51	16.3	3	12.5
15–39 years	133,919	74.4	251	74.5	236	75.4	15	62.5
40 and over	16,795	9.4	32	9.5	26	8.3	6	25.0
Not stated	357	.1	—	—	—	—		
Total	179,691	100.0	337	100.0	313	100.0	24	100.0

[a] *Historical Statistics of the U.S. 1789–1945*, (U.S.G.P.O., 1949), p. 37.

a total of 10 samples, would be sufficient to give adequate age distributions for aliens and U.S. citizen arrivals.

Historical series, of which the immigration statistics is only one illustration, are primarily the by-products of legal or administrative procedures. The annual immigration series starts with 1820 because the furnishing of immigration lists or manifests of passengers to the collector of customs at ports of arrival is first required by a federal act of 1819. The revisions of such series require, in addition to sampling and other statistical techniques, a study of the basis for the data, of the method of establishing and collecting such data, and of the various important changes that occur in any considerable time period. In this connection we may cite changes in geographical coverage, in semantics, in terminology, in recording or tabulating of the data, etc. The process of revising statistical historical data requires a careful study of a wide range of information. Such revisions are necessary if we are to improve the analytical studies of our economic and social past.

REPORT OF COMMITTEE ON STANDARDS —Continued from page 13

d. Munitions Board—"Military Standard Sampling Procedures and Tables" Mil-Std 105A Sept. 11, 1950.

e. American Society for Testing Materials—"Recommended Practice in the Sampling of Physical Materials" 1954.

I should like to express my appreciation to those who have provided me with the wealth of information on which this brief note is based.

WILLIAM W. K. FREEMAN, *Statistician*
Mutual Boiler and Machinery Insurance Co.
Waltham, Massachusetts

MULTIPLE REGRESSION AND CORRELATION —Continued from page 8

large increase in interest has been shown. Applications of the 701 program have been made in a wide number of fields, including applications to psychological and educational testing, industrial processing analysis and control, geophysical studies, derivation of a table of wage rates, and sales promotion. One interesting application in the last-mentioned field of sales promotion has been described by the Rayco Manufacturing Company.[5] It is certain that there will be numerous further applications made in these, and other, fields. We hope, by making public more information about this subject, that the users of digital computing equipment will be more cognizant of the opportunities for useful applications of this type of analysis.

[5] *Business Week*, May 14, 1955.

THE FUTURE ANNUAL MEETINGS OF THE ASSOCIATION WILL BE HELD AS FOLLOWS:

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1956 Detroit, Mich.	**Hotel Sheraton-Cadillac**	**September 7–10, 1956**
1957—Atlantic City, N. J.	Hotel Ambassador	September 10–13, 1957
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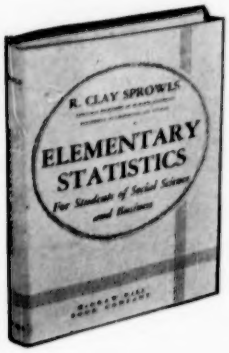

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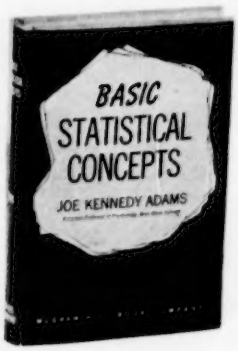

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NEWS ABOUT MEMBERS

George Allen Baker, Professor of Mathematics and Statistician in the Experiment Station, Davis campus, University of California, has been nominated as Faculty Research Lecturer for the academic year 1955–56.

Kurt Benjamin, former head of the tabulating services at the University of Michigan and more recently associated with Pullman Couch Co., Chicago, has been appointed administrative assistant in methods and procedures to Stanley Kritzik, secretary of General Merchandise Co., Milwaukee wholesale mail order firm.

William H. Briede is working as Business Analyst in Operations Research, Directorate of Procurement and Production, Air Materiel Command, at Wright-Patterson Air Force Base.

Donald L. Burkholder is now Assistant Professor of Mathematical Statistics in the Department of Mathematics of the University of Illinois. He received the Ph.D. degree in Statistics at the University of North Carolina, August, 1955.

Octavio Cabello has returned to New York to resume his duties as a statistician of the Statistical Office of the United Nations, after having served as the Coordinator of the Inter-American Centre on Biostatistics since its establishment by the United Nations, the World Health Organization and the Government of Chile, in Santiago, Chile, in 1952.

Henry P. Caulfield, Jr., formerly Staff Assistant for Economic Analysis, Technical Review Staff, Office of the Secretary of the Interior, has resigned from Government service to join the staff of Resources for the Future, Inc., in Washington.

Louis E. Corey, Firestone Tire & Rubber Company, has been transferred to Philadelphia in the capacity of Buying Guide Analyst. He will be responsible for sales analysis, inventory control, and purchases of the Eastern Division, Firestone Stores.

Samuel J. Dennis has transferred from the Office of the Coordinator, International Statistics, Bureau of the Census, to the Office of the Assistant Director for Statistical Standards.

Paul R. Dunlap is working for the Glenn L. Martin Company in Baltimore, Maryland.

Elizabeth C. Ellerson is a survey statistician in the Statistics Branch, Analysis Division, Quality Surveillance Department, at the Naval Powder Factory in Indian Head, Maryland.

Ira T. Ellis, Economist, E. I. du Pont de Nemours & Company, has been appointed a member of the Economic Forum of the National Industrial Conference Board.

Benjamin Epstein, who was recently promoted to a Professorship of Mathematics at Wayne University, is on sabbatical leave during the 1955–56 academic year at Stanford University.

W. Duane Evans, formerly Chief Statistician and head of the BLS Office of Statistical Standards, has been designated Assistant Commissioner of Labor Statistics for Statistics and Standards.

Glenn Fuguitt is studying statistics at the University of North Carolina for a year under a Social Science Research Council Predoctoral Research Training Fellowship.

Harold Glazer has recently joined the staff of the Waltham Laboratories, Sylvania Electric Products, Inc. as a Senior Engineer in the Analysis Department. His primary assignment will be the application of methods of mathematical statistics to the design of programs of machine calculations.

Kermit O. Hanson has recently been appointed Executive Officer of the Accounting, Finance and Statistics Department, College of Business Administration, University of Washington.

A. H. Hassan has left his position as Statistical Analyst with the Department of Water and Power of the City of Los Angeles and is now Assistant General Manager of M & P Auto Parks, Ltd. with headquarters in Beverly Hills, California.

Ruport Hester has joined the central staff of the five-year Project for Evaluation of Treatment in VA Neuropsychiatric Hospitals, with headquarters at Mt. Alto Hospital, Washington, D. C.

Norman F. Heydinger has been appointed head of a new Market Research Department at the L. O. F. Glass Fibers Company.

Clifford Hildreth joined the staff of Michigan State University last August as Professor of Agricultural Economics. He will be doing research and teaching.

George P. Hitchings, manager of the Economic Analysis Department, Ford Motor Company, has been appointed a member of the Economic Forum of the National Industrial Conference Board.

Paul G. Homeyer, who was in Mexico for most of the fall quarter of 1955 as an agricultural statistician with the Food & Agriculture Organization, United Nations, has returned to his position in the Statistical Laboratory, Iowa State College.

David R. Krathwohl has taken a new position as Coordinator of Research in the Bureau of Research and Service, College of Education, Michigan State University.

Roy R. Kuebler, Jr., formerly Associate Professor of Mathematics at Dickinson College, has been in the Office of the Chief of Ordnance, Department of the Army, in Washington, since July. He holds the position of Mathematician in the Design of Experiment Unit, Research and Development Division.

Franklin Lynip is now Director of Distribution Planning at the Carrier Corporation, Syracuse, New York.

William G. Matheny has the position of Human Engineer with the Texas Division, Bell Aircraft Corp., Fort Worth, Texas.

John Winston Mayne, formerly Senior Operational Research Officer of the Joint Services Operational Research Team at Edmonton, Alberta, is now Director of Operational Research for the Royal Canadian Navy at Ottawa.

Mardell Sue Miskowski is now working as Research Engineer in the digital computer group of the Autonetics Division of the North American Aviation Company in Downey, California.

Tulo H. Montenegro has been appointed Secretary-General of the Inter American Statistical Institute and Chief of the Office of Statistics, Pan American Union, succeeding Francisco de Abrisqueta.

Robert W. Olwer, Commander, Supply Corps, U. S. Naval Reserve, has reported for duty as Assistant for Contract Audit, U. S. Navy Area Audit Office, New York, after being detached from the staff of the Inspector General, Supply Corps (Pacific Coast).

Jacob Perlman, formerly with the International Cooperation Administration, is now a United Nations Expert in Bolivia, advising the Government in the fields of economic planning and statistics.

Joan Raup Rosenblatt, a mathematical statistician, has joined the Statistical Engineering Section of the National Bureau of Standard Applied Mathematics Division. She will be primarily concerned with the theory and application of nonparametric techniques of statistical inference.

Ernest M. Scheuer is on educational leave from his position as a mathematician at the U. S. Naval Ordnance Test Station, Pasadena, California, and is pursuing graduate study in mathematics and mathematical statistics at U.C.L.A., where he has an appointment as teaching assistant in the Mathematics Department.

Robert F. Schweiker has joined the Educational Research Corporation as a Research Director and is teaching part time at Tufts University.

Harry S. Sloane, formerly Analytical Statistician, Medical Nutrition Laboratory, Department of the Army, at Denver, has transferred to the Dugway Proving Ground, Department of the Army, at Dugway, Utah, as Analytical Statistician, Test Design and Analysis Section.

Arthur Stein, a U. S. Army Ordnance civilian specialist in ballistic quality control for ten years, has joined the Cornell Aeronautical Laboratory, Inc. as Principal Research Engineer in the Systems Research Department.

William Stephenson has a new position as Director of Research at the Navland Company, Greenwich, Connecticut.

Charles D. Stewart, formerly Assistant Commissioner of Labor Statistics for Publications and Program Planning, has been designated Deputy Assistant Secretary of Labor for Standards and Statistics. This is one of several appointments of top-level career specialists to assist the policy officials of the Department of Labor.

Raymond H. Suttles is now Field Service Representative for the Douglas Aircraft Company in the Guided Missile (Nike) Program.

Aryness Joy Wickens, formerly Deputy Commissioner, Bureau of Labor Statistics, Department of Labor, and a past-president of the ASA, has been appointed Deputy Assistant Secretary for Manpower and Employment, Department of Labor. This is one of a series of appointments of top-level civil service career specialists to assist the policy officials of the Department which are being made in line with the recommendations of the Hoover Commission.

Charles Wrigley, formerly Assistant Professor of Psychology at the University of Illinois, is now Visiting Associate Professor of Psychology at the University of California.

CHAPTER NOTES

Chapter Correspondents and Secretaries are urged to prepare notes on the activities and plans of their chapters for inclusion in THE AMERICAN STATISTICIAN. Some Correspondents and Secretaries are already sending in good material, but most of the items in this section are now being written by the News and Notes Editor on the basis of the announcements of meetings sent to the national office. Since the Editor cannot be present at the meetings such accounts are necessarily limited, and may be rendered inaccurate by last-minute program changes. Let's make the Chapter Notes section of THE AMERICAN STATISTICIAN more interesting and more reflective of chapter activities in 1956! Suggestions will be welcomed as well as contributions.

Send contributions and suggestions to the ASA national office at its new address, 1757 K Street, N.W., marked for the attention of the News and Notes Editor.

ALBANY

The Albany Chapter of the American Statistical Association has conducted the first three of its 1955-56 series of meetings.

The speaker at the first of these, on October 19th, was Vernon G. Lippitt, Consultant on Business Economics and Marketing for the General Electric Company. He described his work and conclusions in setting up determinants of consumer demand for house furnishings and equipment. The final factors in the equation are dominated heavily by consumer income.

The meeting on November 21st was addressed by Dr. Isador Lubin, Industrial Commissioner of the State of New York, former President of the American Statistical Association and United States Commissioner of Labor Statistics. From his wide experience as an economic adviser to governmental and private administrators, Dr. Lubin summarized his experience with statistics as an instrument in policy making with particular reference to its limitations.

At the meeting on December 21st Dr. Alfred W. Jones, Associate Professor of Mathematics at Rensselaer Polytechnic Institute, talked about the relation between operations research and statistics. Dr. Jones was an operations analyst with the Air Force at Okinawa and the Philippines, which directed his attention to the need for a greater emphasis on the application of mathematical methods to operations analysis. Solution of problems in this field offers difficulties not encountered in the more usual sampling problems, where choice of sample size and method involves maximization of the power of the test at a predetermined level of significance. In operations analysis, the aim is for a simultaneous solution giving an optimum choice of significance level and interval estimate. Dr. Jones illustrated the kinds of problem having this requirement from examples in his experience.

The education committee of the Chapter is currently pressing a project intended to provide a full post-graduate course of study in statistics and economics to be given evenings in the Albany area. A similar program in public administration, now provided in Albany by Syracuse University and New York University might possibly be an expandable core for this purpose. The possibility of State participation in this program, paying part or all the tuition for selected employees, is being explored.

BOSTON

At the dinner meeting on November 8th Dr. Eugene Pike of MIT Lincoln Laboratory spoke on "Some New Developments in the Statistical Methods Applicable to Time Series." He discussed new and unpublished material by Tukey, and its application to several fields. At the Chapter's second dinner meeting on December 8th Oliver G. Selfridge of Lincoln Laboratory described experimental work on the learning process in which the traditional college sophomore as the experimental subject is replaced by a machine. Mr. Selfridge proposes "that learning how to recognize patterns is the real essence of any learning process, rather than precise details of conditioned reflexes. A simple program to learn elementary visual pattern recognition has been run on a large digital computer; it illustrates the general model and shows, for example, how one must use past experience to make statistically sensible guesses about future experiments."

CENTRAL INDIANA

The following meetings, all of which were preceded by informal dinners, were held during the fall:

Thursday, October 6: Purdue University Memorial Union; West Lafayette, Indiana
Speaker: Professor Abraham Charnes
Topic: "Recent Industrial Applications of Linear Programming"

Professor Charnes described the development and the theory of the solution of several stochastic models of recent use in industrial problem solving. His primary emphasis was on the technique of formulating the models.

Friday, November 11: Indiana University Medical Center Union Bldg., Indianapolis, Indiana
Speaker: Professor Russell L. Ackoff
Topic: "Operations Research"

Professor Ackoff discussed the general principles involved in this field and demonstrated the methods used in the solution of some actual problems. He presented and discussed several distributions useful in making a choice between various sets of ordered values.

Thursday, December 1: Butler University's Atherton Hall, Indianapolis, Indiana
Speaker: Professor Oscar Kempthorne
Topic: "Analysis of Variance of Experiments"

Professor Kempthorne discussed the General Linear Hypothesis formulation with special attention to the "additivity" assumption involved. He also discussed the alternative method developed by himself and the group associated with the workers at Ames, Iowa.

CENTRAL NEW JERSEY

The speaker at the meeting of December 5th was William Feller, Higgins Professor of Mathematics at Princeton since 1950. Professor Feller's subject was "Types of Chance Fluctuations".

CLEVELAND

The program of the Cleveland Chapter for the year 1955–56 is as follows:

September 27, 1955—"Digital Computers" by E. F. Ormsby, Applied Science Representative, International Business Machines Corporation, Cleveland.

October 26, 1955—"Sampling" by H. F. Dodge, Bell Laboratories, New York.

November 22, 1955—"Experimental Attainment of Optimum Conditions" by by J. S. Hunter, American Cyanamid, New York.

January 25, 1956—"Game Theory" by E. L. Arnoff, Professor, Case Institute of Technology, Cleveland.

February 28, 1956—"Acceptance Testing" by E. B. Gasser, Toni, Chicago.

March 27, 1956—"Income Tax Return" by A. C. Rosander, United States Treasury, Washington.

April 24, 1956—"Production Planning" by E. H. Robinson, Johnson and Johnson, Chicago.

May 22, 1956—"Practical Application of Linear Programming in the Selection of Ores for Pig Iron Production" by Harold Trask, Cleveland Cliffs Iron Company, Cleveland.

CONNECTICUT

A meeting preceded by dinner was held on December 13th at which the speaker was Romvald Slimak, Chief Statistician, Electronic Computer Department, Sperry Rand Corporation. Mr. Slimak's subject was "Statistical Applications of Large Scale Electronic Computers".

HAWAII

At the meeting of October 14th Dr. Herbert Weaver, Professor of Psychology at the University of Hawaii and President of the Hawaii Psychological Association, spoke on the progress of the psychological profession in establishing and maintaining standards of competency and professional ethics. Dr. Weaver described the stages of development in the establishment of standards of professional competency and a code of ethical standards. The American Psychological Association has taken the lead during the last decade in determining what the standards should be and how they should be administered.

The speaker at the November 9th meeting was Dr. William R. Pabst, Jr., Chief Statistician for the Bureau of Ordnance of the Navy. Dr. Pabst spoke on "Some Engineering Uses of the Statistical Design of Experiments", describing applications of modern statistical theory to engineering and ordnance testing.

In December the Hawaii Chapter sent a questionnaire to its members on the desirability of the ASA developing standards for statisticians. A 62 percent response was obtained within one week. Twenty-one members replying favored the publication of a set of standards, two were opposed and one had no opinion. Most of those voting in the affirmative favored both technical and ethical standards. Only five members indicated they could furnish examples of critical incidents, however, while seven expressed willingness to serve on a local committee.

ITHACA

The Chapter polled its members last fall on the advisability of ASA action on statistical standards. Little interest was expressed, only nine of the 46 questionnaires having been returned after a period of three weeks. Of these nine, four said "do nothing", one voted for a set of technical standards, one favored developing something like the Ten Commandments for Statisticians, and three commented that some critical incidents should be collected to see whether there was a problem.

LOS ANGELES

The following officers have been elected to serve for the 1955–56 year:

President: Hugh H. Brown, California Taxpayers Association (re-elected)
Vice-President: John A. Scott, General Telephone Co.
Treasurer: Charles R. Harbst, Douglas Aircraft Co.
Secretary: Alvord L. Boeck, Kwikset Locks, Inc.

A dinner meeting, preceded by holiday cocktails, was held on December 8th, at which the speaker was Edwin N. Alderman, Manager of Administrative Services, Chrysler Motors Corporation. Mr. Alderman's subject was "Statistics in the Automotive Industry as Interpreted by the Chrysler Motors Corporation".

The Los Angeles Chapter has also conducted a survey of its members' views on the development of statistical standards. Of 53 inquiries mailed out, 25 replies were received—a response rate of 47 percent. The following table shows the distribution of replies:

	Favor Strongly	*Favor Mildly*	*Oppose Strongly*	*Oppose Mildly*	*Uncertain or Indifferent*
Technical Standards	14	4	—	—	7
Code of Ethics	17	4	1	—	3
Licensing and Certification	8	6	8	1	2

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CHAPTER NOTES

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PHILADELPHIA

A meeting was held on November 18th at which the question of development of statistical standards was discussed. A proposal to set up a committee to study the various alternatives, consider the pro's and con's, and devise a questionnaire for evaluating the feelings of the members was defeated. No further action on the subject of standards is planned.

ROCHESTER

The Rochester Chapter successfully launched its program activities October 11 with an excellent presentation by its first speaker, Dr. Ralph J. Watkins, President of the American Statistical Association and Director of Research for Dun and Bradstreet. His topic was "Measuring Businessmen's Expectations" and he described the methods used by Dun and Bradstreet in carrying out their routine surveys to forecast business trends based on businessmen's expectations on such matters as sales, prices, and inventories. Dr. Watkins discussed some of the sampling techniques involved in getting the necessary data and the use of diffusion indexes in its analysis.

On November 7, Mr. William N. Hosley of the Eastman Kodak Company spoke on "A Decision Rule for Production Planning and Inventory Control." This decision rule entails the solution of a system of cost equations for a minimum cost production program. The costs to be minimized are those associated with the response to fluctuations in orders or sales such as changes in the size of the work force, changes in number of hours worked and the cost of absorbing fluctuations in orders with inventories. Various intangibles such as employee morale should also be considered.

The Chapter has conducted a poll of membership views on the establishment of statistical standards. Of approximately 80 questionnaires sent out 21 replies were returned. Fifteen favored publication by the ASA of a set of statistical standards, one was opposed and five didn't care. Most of those voting in the affirmative favored both technical and ethical standards. Five expressed willingness to serve on a local committee, but no one indicated ability to furnish examples of critical incidents.

ST. LOUIS

At the meeting of December 14th Donald Paul, Statistician with the Laclede Gas Co., spoke on "Sales Forecasting for the Local Market: Laclede Gas Company". Mr. Paul discussed demand determinants, the changing St. Louis scene and the good neighbor pricing policy.

WASHINGTON

"Experimental Potpourri" was the subject of the November 28th meeting, at which several statisticians in the Federal Government explained some interesting aspects of their design problems. William R. Pabst, Jr., Chief Statistician, Bureau of Ordnance, chaired the meeting. The speakers were Churchill Eisenhart, Chief, Statistical Engineering Laboratory, National Bureau of Standards; Glenn L. Burrows, Statistical Clearance and Standards, Department of Agriculture; and Jerome Cornfield, Office of the Director, National Institutes of Health.

Because of the holidays and the ASA annual meeting in New York no meeting was held in December.